CLAIMS

1. A process for isolating nucleic acids comprising the following steps:
- charging a surface from a given direction with nucleic acids;
- immobilizing the nucleic acids on the surface;
- releasing the immobilized nucleic acids from the surface; and
- removing the released nucleic acids from the surface, essentially in the same direction of the charging.

2. The process according to claim 1, wherein the charging takes place from the top.

3. The process according to claim 1 or 2, wherein, between the immobilization and release steps, a washing of the immobilized nucleic acids with at least one washing buffer takes place.

4. The process according to claim 3, wherein the washing includes the following steps for each washing buffer:
- transferring a predetermined amount of washing buffer to the surface, and
- drawing the washing buffer through the surface by suction.

5. The process according to any of claims 1, 2 or 4, wherein the charging and immobilization of the nucleic acids includes the following steps:
- mixing of the nucleic acids with an immobilization buffer;
- charging of the nucleic acids with the immobilization buffer on to the surface;
- drawing the fluid components through the surface essentially in the direction of the charging.

6. The process according to any of claims 1, 2 or 4, wherein at least one of the steps is carried out completely automatically by means of an automatic machine.

7. The process according to claim 6, wherein all the steps in the process are carried out by an automatic machine in a controlled sequence.

8. The process according to claim 6, wherein multiple isolations of nucleic acids are carried out simultaneously using a multiplicity of surfaces.

9. The process according to any of claims 1, 2 or 4, characterized by the fact that between the release and the removal steps at least one of the following steps is also carried out:

- carrying out of at least one chemical reaction on the nucleic acids;
- immobilization of the nucleic acids on the surface; and
- release of the immobilized nucleic acids from the surface.

10. The process according to claim 5, wherein said immobilization buffer includes aqueous solutions of salts of alkaline and alkaline earth metals with mineral acids.

11. The process according to claim 10, wherein said immobilization buffer includes alkaline or alkaline earth halogenides or sulfates.

12. The process according to claim 11, wherein said immobilization buffer includes halogenides of sodium or potassium or magnesium sulfate.

13. The process according to claim 5, wherein said immobilization buffer includes aqueous solutions of salts from monobasic or polybasic or polyfunctional organic acids with alkaline or alkaline earth metals.

14. The process according to claim 13, wherein said immobilization buffer includes aqueous solutions of salts of sodium, potassium, or magnesium with organic dicarboxylic acids.

15. The process according to claim 14, wherein said organic dicarboxylic acid is oxalic acid, malonic acid, or succinic acid.

SUB A5

16. The process according to claim 13, wherein said immobilization buffer includes aqueous solutions of salts of sodium or potassium in combination with hydroxycarboxylic or polyhydroxycarboxylic acid.

17. The process according to claim 16, wherein said polyhydroxycarboxylic acid is citric acid.

18. The process according to claim 5, wherein said immobilization buffer includes hydroxyl derivates of aliphatic or acyclic saturated or unsaturated hydrocarbons.

19. The process according to claim 18, wherein said hydroxyl derivatives are C1-C5 alkanols.

20. The process according to claim 19, wherein said alkanols are selected from methanol, ethanol, n-propanol, tert.-butanol and pentanols.

21. The process according to claim 18, wherein said hydroxyl derivative is an aldite.

22. The process according to claim 5, wherein said immobilization buffer includes a phenol or polyphenol.

23. The process according to claim 3, wherein the washing step is carried out using a salt solution or a buffer solution pursuant to any one of claims 4 through 22.

24. The process according to claim 1, wherein the releasing step is carried out using an aqueous salt or buffer solution.

SUB A6

25. The process according to claim 1, wherein the nucleic acids immobilized on the surface are release using water.

26. The process according to claim 3, wherein said immobilization buffer includes chaotropic agents.

27. The process according to claim 26, wherein the chaotropic agent is selected from the group of trichloro-acetates, thiocyanates, perchlorates, iodides, guanidinium hydrochloride, guanidinium isothiocyanate, and urea.

28. The process according to claims 26, wherein said immobilization buffer comprises 0.01-molar to 10-molar aqueous solutions of the chaotropic agents, alone or in combination with other salts.

29. The process according to claim 28, wherein said immobilization buffer comprises 0.1-molar to 7-molar aqueous solutions of chaotropic agents, alone or in combination with other salts.

30. The process according to claim 29, wherein said immobilization buffer comprises 0.2-molar to 5-molar aqueous solutions of chaotropic agents, alone or in combination with other salts.

31. The process according to one of claims 26 through 30, wherein said immobilization buffer comprises an aqueous solution of sodium perchlorate, guanidinium hydrochloride, guanidinium isothiocyanate, sodium iodide, or potassium iodide are used for the immobilization of nucleic acids.

32. The process according to claim 1, wherein the surface is a membrane.

33. The process according to claim 32, wherein the membrane is a hydrophobic membrane.

34. The process according to claim 33, wherein the hydrophobic membrane is made of a polymer with polar groups.

35. The process according to claim 32, wherein the membrane is a hydrophilic membrane with a hydrophobisized surface.

36. The process according to claim 32, wherein the membrane is composed of a polymeric material selected from the group consisting of nylon, a polysulfone, polyether sulfone, polycarbonate, polyacrylate, acrylic acid copolymer, polyurethane, polyamide, polyvinyl chloride, polyfluorocarbonate, polytetrafluoroethylene, polyvinylidene fluoride, polyvinylidene difluoride, polyethylene tetrafluoroethylene copolymerisate, polyethylene chlorotrifluoroethylene copolymerisate, and polyphenylene sulfide.

37. The process according to claim 36, wherein the membrane consists of hydrophobisized nylon.

38. The process according to claim 36, characterized by the fact that the membrane is coated with a hydrophobic coating agent selected from the group of paraffins, waxes, metallic soaps, optionally in admixture with aluminum or zirconium salts, quaternary organic compounds, urea derivates, lipid-modified melamine resins, silicones, organic zinc compounds, and glutaric dialdehyde.

39. The process according to claim 32, wherein the membrane is a hydrophilic or hydrophilized membrane.

40. The process according to claim 39, wherein the membrane is composed of hydrophilized nylon, polyether sulfone, polycarbonate, polyacrylate, acrylic acid copolymer, polyurethane, polyamide, polyvinyl chloride, polyfluorocarbonate, polytetrafluoroethylene, polyvinylidene fluoride, polyvinylidene difluoride, polyethylene tetrafluoroethylene copolymerisate, polyethylene chlorotrifluoroethylene copolymerisate, or polyphenylene sulfide.

41. The process according to any on of claims 32 through 40, wherein the pores in the membrane have a diameter of 0.001 to 50 micrometers, preferably from 0.01 to 20 micrometers, most preferably from 0.05 to 10 micrometers.

42. The process according to claim 1, wherein the surface is a hydrophobic fleece.

43. The process according to claim 42, wherein the fleece is a silica gel fleece.

44. The process according to claim 43, wherein chaotropic agents are used for the immobilization of the nucleic acids.

45. The process according to claim 44, wherein the chaotropic agent is selected from the group of trichloro-acetates, thiocyanates, perchlorates, iodides, guanidinium hydrochloride, guanidinium isothiocyanate, and urea.

46. The process according to claim 44, wherein 0.01-molar to 10-molar aqueous solutions of chaotropic agents, alone or in combination with other salts, are used for the immobilization of nucleic acids.

47. The process according to claim 46, wherein 0.1-molar to 7-molar aqueous solutions of chaotropic agents, alone or in combination with other salts, are used for the immobilization of nucleic acids.

48. The process according to claim 47, wherein 0.2-molar to 5-molar aqueous solutions of chaotropic agents, alone or in combination with other salts, are used for the immobilization of nucleic acids.

SUB A9 cont

49. The process according to any one of claims 44 through 48, wherein an aqueous solution of sodium perchlorate, guanidinium hydrochloride, guanidinium isothiocyanate, sodium iodide or potassium iodide are used for the immobilization of nucleic acids.

50. The process according to claim 5, wherein said immobilization buffer has a pH of from 3 to 11.

SUB A10

51. A process for isolating nucleic acids comprising immobilization of nucleic acids on one side of a membrane, followed by release of the nucleic acids and collection of the nucleic acids from the same side of the membrane on which they were immobilized.

52. The process according to claim 51, wherein the membrane is composed of a material selected from the group consisting of nylon, polysulfone, polyether sulfone, polycarbonate, polyacrylate, acrylic acid copolymer, polyurethane, polyamide, polyvinyl chloride, polyfluorocarbonate, polytetrafluoroethylene, polyvinylidene fluoride, polyvinylidene difluoride, polyethylene tetrafluoroethylene copolymerisate, polyethylene chlorodifluoroethylene copolymerisate, and polyphenylene sulfide.

53. The process according to claim 52, wherein the membrane is a hydrophobisized nylon membrane.

54. The process according to claim 51, wherein the membrane is a hydrophilic membrane, which is coated with a hydrophobic coating agent selected from the group consisting of paraffins, waxes, metallic soaps, optionally in admixture with aluminum or zirconium salts, quaternary organic compounds, urea derivates, lipid-modified melamine resins, silicones, organic zinc compounds, and glutaric dialdehyde.

SUB A11

55. The process according to claim 51, wherein a plurality of said membranes are incorporated in isolation devices installed on a multi-well plate.

56. An apparatus adapted to the automatic performance of a process according to any one of claims 1 through 49.

57. The apparatus of claim 56, comprising at least one vacuum apparatus suitable for automatically carrying out the application of buffers and solutions to a surface in an isolation device and automatically removing buffers and solutions away from the surface.

58. The process according to one of claims 51 through 55, wherein the immobilization of nucleic acids takes place at a pH of from 3 to 11.

ADD A12